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[TITLE OF THE INVENTION] REMOTE CONTROL SYSTEM

[Summary]

[Object] To provide a remote control system that has no problem in relation to security, is economical and simple.

[Means to Solve] A remote controller 1 specifies predetermined control information out of the control information of a controller on the side of a user 2, generates a text including the specified control information and composed of character strings for an electronic mail and sends an electronic mail including requested control information to the controller on the user's side 2. The controller on the user's side 2 analyzes the received electronic mail, activates a network control interface, collects required control information, converts the collected control information from the character strings for the electronic mail to a text and sends it to the remote controller 1 by an electronic mail. The remote controller 1 executes the remote monitoring and the remote maintenance of a network on the user's side based upon the received control information.

[Claims]

[Claim 1] A remote control system, comprising:

a controller on the side of a user that controls a network; and

a remote controller that controls the controller on the user's side remotely, wherein:

the remote controller comprises:

specification means that specifies predetermined control information out of control information collected by the controller on the user's side;

generation means that generates a text including character strings for an electronic mail based upon the control information specified by the specification means; and

sending means that sends the text generated by the generation means to the controller on the user's side by an electronic mail; and

the controller on the user's side comprises:

conversion means that analyzes the text sent by the sending means and converts the text to a signal for activating a network control interface;

collection means that collects control information according to the signal output from the conversion means;

conversion means that converts the control information collected by the collection means to a text including character strings for an electronic mail; and

user side sending means that sends the text converted by the conversion means to the remote controller by an

electronic mail.

[Claim 2] A remote control system according to Claim 1, wherein:

a function for sending a binary file stored in the controller on the user's side by an electronic mail as an attached fail is provided.

[Detailed Description of the Invention]

[0001]

[Technical Field to which the Invention Belongs] The present invention relates to a remote control system, particularly relates to a remote control system that controls a controller on the side of a user for controlling a network on the user's side remotely.

[0002]

[Prior Art] As the enlargement of the scale of a network and the increase of communication equipment vendors progress, a network system is in a process of proceeding from a system proper to a vendor to a TCP/IP system which is called a standard of the industry. A network the vendors of which increase is considered to include these systems for the present and the control of the network is required to correspond to this situation. Under such a background, a control integrated system that realizes the control of a composite network such as large-scale LAN with FDDI as a backbone is developed. The conventional type integrated network control system is generally installed every enterprise and the control of the

network is performed every enterprise.

[0003]

[Problems that the Invention is to Solve] However, in the above-mentioned conventional type integrated network control system, the control of the network is performed every enterprise and another management company cannot directly control the network of an enterprise. This reason is that the secrete information of each enterprise is also included in the management information of each enterprise in addition to information which is disclosed to a management company and based upon which the management company controls the network of each enterprise and the management company cannot directly control the network of each enterprise because of a restriction upon security. Therefore, in case each enterprise entrusts a management company with the network of itself, a detailed maintenance contract is required to be made to protect the security of each enterprise so that the management company directly controls the network of each enterprise and a complicated procedure is required. There is also a problem that enormous expense is required to form an access path that directly connects a management company and each enterprise.

[0004] The object of the invention is to provide an economical and simple remote control system without a problem in security.

[0005]

[Means for Solving the Problems] A remote control system

according to a first aspect includes a controller on the side of a user that controls a network and a remote controller that remotely controls the controller on the user's side, the remote controller includes specification means that specifies predetermined management information out of management information collected by the controller on the user's side, generation means that generates a text composed of character strings for an electronic mail based upon management information specified by the specification means and sending means that sends the text generated by the generation means to the controller on the user's side by an electronic mail, and the controller on the user's side includes conversion means that analyzes the text sent by the sending means and converts the text to a signal for activating the control interface of the network, collection means that collects management information according to the signal output from the conversion means, conversion means that converts the management information collected by the collection means to a text composed of character strings for an electronic mail and sending means on the user's side that sends the text converted by the conversion means to the remote controller by an electronic mail.

[0006] According to the above-mentioned configuration, the remote controller can control the controller on the user's side using an electronic mail. That is, the remote controller

demands predetermined management information out of the management information of the controller on the user's side by an electronic mail, the controller on the user's side collects the demanded management information based upon the text of the sent electronic mail in response to this demand and can send the collected management information to the remote controller by an electronic mail. Such an electronic mail is generally used between enterprises widely, hardly has a problem in security and an access path can be easily formed. Therefore, as described above, an electronic and simple remote control system wherein the management information of a network on the user's side is collected using an electronic mail, remote control and remote maintenance can be made based upon the information and there are few problems in security can be provided.

[0007] The remote control system according to the second aspect is provided with a function for sending a binary file stored in the controller on the user's side as an attached file by an electronic mail in addition to the configuration of the remote control system according to the first aspect.

[0008] According to the configuration, management information stored in the form of the binary file can be sent with the management information stored in the file and even if the electronic mail includes much management information, a large quantity of information can be efficiently sent.

[0009]

[Mode for Carrying out the Invention] Referring to the drawings, a remote control system equivalent to one embodiment of the invention will be described below. FIG. 1 is a block diagram showing the whole configuration of the remote control system equivalent to one embodiment of the invention.

[0010] As shown in FIG. 1, the remote control system includes a remote controller 1 installed on the side of a management company, a controller on the user's side 2 installed in an enterprise on the user's side (for example, a company A), backbone LAN 3, local LAN 4 and 5, terminal equipment 6 to 10 connected to a network such as a workstation, a personal computer and a printer and repeating installation 11 and 12 such as a bridge and a router.

[0011] An integrated network control system, for example an integrated network control system by Sumitomo Electric Industries, Ltd. is installed in the controller on the user's side 2 and controls a network composed of LANs 3 to 5 and network elements 6 to 12. This integrated network control system is software provided with various functions such as a man-machine interface, a control function, a management information storage and a control protocol. The controller on the user's side 2 executes various functions such as control over configuration, failure and performance by the integrated network control system and controls a network. A mail gateway

described later is installed in the controller on the user's side 2, a text sent according to the format of a normal electronic mail is converted to data which can be processed by the integrated network control system and management information is collected based upon the converted data.

[0012] The remote controller 1 of the management company and the controller on the user's side 2 of the company A are connected via an electronic mail and data can be sent by the electronic mail. That is, a mail server described later is respectively installed in the remote controller 1 and the controller on the user's side 2 and an electronic mail can be sent or received between them. In case the integrated network control system is installed in the remote controller 1, the integrated network control system can control the network on the user's side via the controller on the user's side 2. Even if the integrated network control system is not installed, information can be seen by dedicated GUI. Further, registration data the user of which is registered beforehand is stored in the remote controller 1 and in this embodiment, data related to the company A is registered. In this embodiment, the remote control of the company A will be described, however, a user is not limited to the company A and if only each enterprise and a management company are connected via an electronic mail in the case of plural users, the network of each user can be controlled as in this embodiment.

[0013] According to the above-mentioned configuration, the remote controller 1 acquires the information (log) of configuration, failure and performance collected by the controller on the user's side 2 using an electronic mail (for example, via the Internet) and can execute the remote monitoring and remote maintenance of the network on the user's side based upon the acquired information. Generally, in case a user is an enterprise and a government office, connection at real time according to IP is difficult because of a restriction upon security, however, in the case of connection via an electronic mail as described above, an electronic mail is widely used between enterprises, has few problems in security and an access path is easily formed by an electronic mail. Therefore, the economical and simple remote control system having no problem in security can be provided.

[0014] Next, information which the remote controller 1 of the management company can collect using an electronic mail owing to the above-mentioned configuration will be described. Information which the controller on the user's side 2 can collect is roughly classified into two. One is the log information of failure and performance generated based upon information which the controller on the user's side 2 itself collects from network elements 3 to 12 composing each network. The other is information acquired as a result of directly using a function for collecting equipment information which the

controller 2 has.

[0015] For information which the controller 2 holds, there are the name and address of a network element, configuration information such as connection and a position, failure log, a trouble ticket (a failure report), performance log, down-load log (the down-load log of a specific equipment) and system log (the log of the controller itself: for maintenance). The above-mentioned each information is stored in the form of a file or in a database inside the controller 2.

[0016] In the meantime, information acquired using a function for collecting equipment information of the controller 2 is generally acquired in the form of a management information base (MIB) according to a protocol called a simple network management protocol (SNMP). If an electronic mail can reach the network on the user's side from the remote controller 1 according to SNMP, information can be directly acquired, however, generally, realization is difficult because of the problem of a line and security. Therefore, if the function of an electronic mail according to SNMP is realized in the configuration, the real information (MIB) of equipment composing the network can be acquired. However, in case MIB of equipment is acquired according to SNMP, multiple frames are often repeated, however, in the present situation of an electronic mail, it is desirable that the frequency of communication is not much. In this embodiment, a request for

the acquisition of MIB is sent to the controller on the user's side 2 together as one mail, the controller on the user's side 2 analyzes it into plural, collects real information from each equipment composing the network, integrates the result and sends it by an electronic mail. As the integrated network control system used in this embodiment has a service interface for integrating MIB, this embodiment utilizes this function. [0017] Next, the format of an electronic mail sent from the remote controller 1 to the controller on the user's side 2 will be described. FIGs. 2 and 3 show first and second formats of an electronic mail sent from the remote controller shown in FIG. 1, FIG. 2 shows information which the controller on the user's side 2 holds and FIG. 3 shows MIB.

[0018] First, referring to FIG. 2, a case that an electronic mail including information which the controller on the user's side 2 holds is sent will be described. "To: Net@xxx. xxx. co. jp" denotes the destination of the electronic mail, "From: xxxx" denotes an originator and "Subject:Dr_Net_Request" denotes the title of the mail. "Req= GetLog" shown under a broken line denotes a request for the collection of log information, "Category=FM" denotes fault management as a category, "Target=equipment A" denotes that a target the log information of which is to be collected is equipment A, "infor=AlarmLog" denotes that requested information is alarm log and "MaxLogs=10" denotes that maximum ten logs are

collected. In case the above-mentioned electronic mail is sent from the remote controller 1 to the controller on the user's side 2, the controller on the user's side 2 sends the alarm log of the equipment A which itself holds to the remote controller 1 by an electronic mail.

[0019] Next, a case that information requested by the remote controller 1 is information acquired using a function for collecting the equipment information of the controller on the user's side 2, that is, MIB will be described. The destination of an electronic mail, the originator and the tile shown in FIG. 3 are similar to those shown in FIG. 2. Next, "Req=GetMIB" shown under a broken line denotes that it is a request for information according to MIB, "Target=equipment A" denotes that a target the information of which is to be collected is equipment A, "MIB=ifIndex" denotes that requested MIB is an interface index and "MIB=ifOperStatus" denotes that requested MIB is an interface operated status. Therefore, in case the electronic mail shown in FIG. 3 is sent from the remote controller 1 to the controller on the user's side 2, the controller on the user's side 2 collects the information of the interface index and the interface operated status of the equipment A using its own function for collecting equipment information and sends the collected information to the remote controller 1 by an electronic mail. A large quantity of data such as performance management data can be sent in smaller

transfer quantity by converting the data to a binary file which can be sent by an electronic mail and the sent frequency and the sending time of electronic mails can be reduced.

[0020] Next, the process structure of the remote control system shown in FIG. 1 will be described. FIG. 4 shows the process structure of the remote control system shown in FIG. 1.

[0021] As shown in FIG. 4, the remote controller 1 as process structure includes a graphical user interface (GUI) 21, a mail application 22, an integrated network control system 23 and a mail server 24. The controller on the user's side 2 includes GUI 31, a failure server 32, a performance server 33, a scheduler 34, a storage for a network element (NE) 35, SNMP-GW 36, a mail gateway 37 and a mail server 38. Each process is included in a normal integrated network control system on the user's side except the mail server 38 and the mail gateway 37.

[0022] Various user interfaces are provided by GUI 21, a user specifies management information requested to the controller on the user's side 2 by the mail application 22 using the screen displayed by GUI 21 and creates an electronic mail of a format shown in FIG. 2 or 3. The created electronic mail is sent from the mail server 24 to the mail server 38. A text received by the mail gateway 37 of the sent electronic mail is analyzed and is converted to a signal for activating the control interface of the controller on the user's side. In the case of the electronic mail shown in FIG. 2 including information

which the controller on the user's side 2 holds, the failure server 32 or the performance server 33 corresponds to the control interface and in the case of the electronic mail including MIB shown in FIG. 3, the scheduler 34 corresponds. Therefore, according to the converted signal, the failure server 32, the performance server 33, the scheduler 34 and SNMP-GW 36 are operated and in case information which the controller on the user's side 2 holds is requested, predetermined information is collected from the failure server 32 or the performance server 33 depending upon the information. In case the requested information is MIB, SNMP-GW 36 is activated by the control of the scheduler 34, the requested information is instructed to be sent to equipment which is a target and is collected. Each information collected by the above-mentioned processing is converted to a text composed of character strings for an electronic mail by the mail gateway 37 and is sent to the mail server 38. The mail server 38 sends an electronic mail including the collected information to the mail server 24. The mail server 24 sends management information included in the received electronic mail to GUI 21 and the integrated network controller 23, and the remote controller 1 executes remote monitoring and remote maintenance for the network of the controller on the user's side 2 based upon this information.

[0023] According to the above-mentioned process structure,

management information is requested from the remote controller 1 to the controller on the user's side 2 via an electronic mail, the requested information can be sent from the controller on the user's side 2 to the remote controller 1 via an electronic mail in response to the request, and remote monitoring and remote maintenance are enabled based upon the information.

[Brief Description of the Drawings]

[FIG. 1] FIG. 1 is a block diagram showing the whole configuration of a remote control system equivalent to one embodiment of the invention;

[FIG. 2] FIG. 2 shows a first format of an electronic mail sent by a remote controller shown in FIG. 1;

[FIG. 3] FIG. 3 shows a second format of an electronic mail sent by the remote controller shown in FIG. 1; and

[FIG. 4] FIG. 4 shows the process structure of the remote control system shown in FIG. 1.

[Description of Reference Numerals]

- 1. Remote controller
- 2. Controller on the user's side
- 3 to 5. LAN
- 6 to 10. Terminal equipment
- 11, 12. Repeating installation

DRAWINGS

[FIG. 1]

MANAGEMENT COMPANY

ELECTRONIC MAIL

COMPANY A

[FIG. 2] [FIG. 3]

EQUIPMENT A

[FIG. 4]

22. MAIL AP

23. INTEGRATED NETWORK CONTROLLER

24. MAIL SERVER

37. MAIL GW

38. MAIL SERVER

32. FAILURE S

33. PERFORMANCE S

34. SCHEDULER